BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering
Unit number and title	**Unit 23: Digital and Analogue Electronic Systems**
Learning aim(s)	**A:** Examine the principles of analogue and digital electronic systems as applied in industry
Assignment title	Principles of analogue and digital systems
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You have successfully completed part of an Apprenticeship with a company which provides complex electronic products for a wide range of industries. Your latest placement in the company is with the Field Service Department. The Department is responsible for providing technical support to customers' maintenance teams and can often involve you visiting customer premises to carry out fault-finding on your company's products. You will be working with a Senior Field Service Engineer initially. Your Supervisor has identified some knowledge and skills that you need to develop before you can be allowed to carry out repairs by yourself.

Task 1	You have been asked to investigate complex open and closed loop analogue and digital systems, how they can be represented in block diagram form and the characteristics of waveforms at key points. **To do this:** Your tutor will provide you with schematic drawings for a range of analogue and digital circuits. You need to: • Research the properties of analogue and digital signals; and the need for signal conditioning in each type of circuit; and • Investigate the differences between open and closed loop systems. You then need to investigate the circuits that you have been given and produce a report that includes information about: a) the properties of analogue and digital signals in the

	circuits that you are investigating. • For analogue systems you should provide a definition of analogue signals, along with explanations of signal characteristics including periodic waveforms; frequency and time period; and 'average' values. • For digital systems, you need to include a definition of digital signals and digital technologies, supported by explanations of ideal and practical digital signal values. • You should compare how measured signals compare with theoretical ones in both cases. For example, the effects of noise on signals, how measured signal levels systems compare with nominal levels. b) the need for signal conditioning in the investigated circuits. For analogue systems you should consider filtering, amplification, level shifting, along with gain and offset. For digital systems you should consider Schmitt trigger, TTL to CMOS, CMOS to TTL, fan-in, and fan-out. **You should then:** Carry out an investigation into open and closed loop analogue and digital systems • Define open and closed loop systems and show how they can be represented in block diagram form. • Derive open-loop and closed-loop transfer functions from first principles • Use the results to determine the expected output for each given system from the given input signals. • Use the given circuit schematics and block diagrams of complex analogue and digital systems to identify the nature of the expected signals at the identified key test points.
Checklist of evidence required	A written report exploring the characteristics of analogue and digital signals, system blocks, block diagrams, open-loop and closed-loop control systems and supporting calculations.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
23/A.D1	Evaluate, using language that is technically correct and of a high standard, the characteristics of the two systems in open- and closed-loop systems, calculating the expected outputs.
23/A.M1	Analyse signals and their flow in the two systems calculating the outputs for open- and closed-loop systems.
23/A.P1	Explain, using examples, the characteristics of analogue and digital signals.
23/A.P2	Draw a block diagram of a complex analogue and a complex digital electronic system.
23/A.P3	Explain the operation of open- and closed-loop systems in a complex analogue and a complex digital system using block diagrams and calculate the output of each given input.
Sources of information to support you with this Assignment	**Books** Electronics: A systems approach; Storey N; Prentice Hall (2013); ISBN-13: 978-0273773276 Practical Electronics for Inventors; Scherz P Monk S; McGraw-Hill Education TAB (2016); ISBN-13: 978-1259587542 Electronics; Sparkes JJ et al; Nelson Thornes Ltd (2003); ISBN 0 7487 7036 4 Electronic devices; Floyd T L; Pearson (2007); ISBN-13: 978-0136155812 Digital fundamentals; Floyd T L; Pearson (2015); ISBN-13: 978-1292075983 BTEC Nationals Engineering Student Book + Activebook: For the 2016 Specifications (BTEC Nationals Engineering 2016); Buckenham A et al; Pearson Education (2016); ISBN-13: 978-1292141008 **Websites** electronics-tutorials.ws/ Further useful resources may be found at qualifications.pearson.com/en/support/published-resources.html#step1